A Commissioner's Perspective on Nuclear Safety and NRC's Response to Nuclear Events in Japan

NRC Commissioner William C. Ostendorff

June 6, 2011

Nuclear Safety Workshop
Preliminary Lessons Learned From Fukushima Daiichi
U.S. Department of Energy
Arlington, Virginia

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Agenda

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

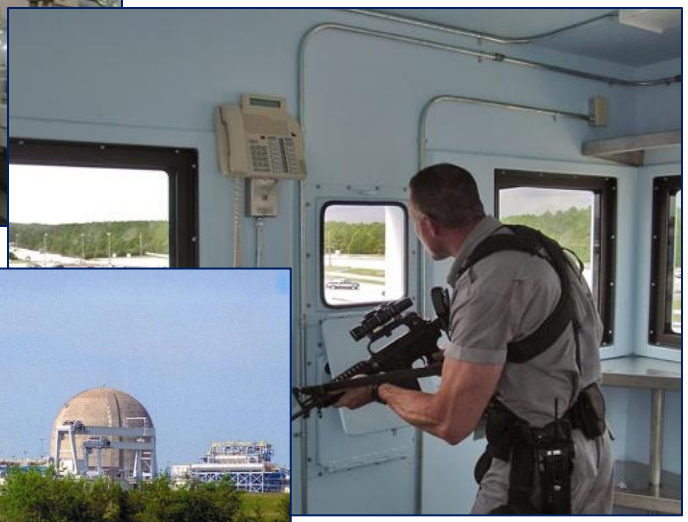
- About the NRC
- Fukushima Event
- NRC Actions
- Conclusion

What we do

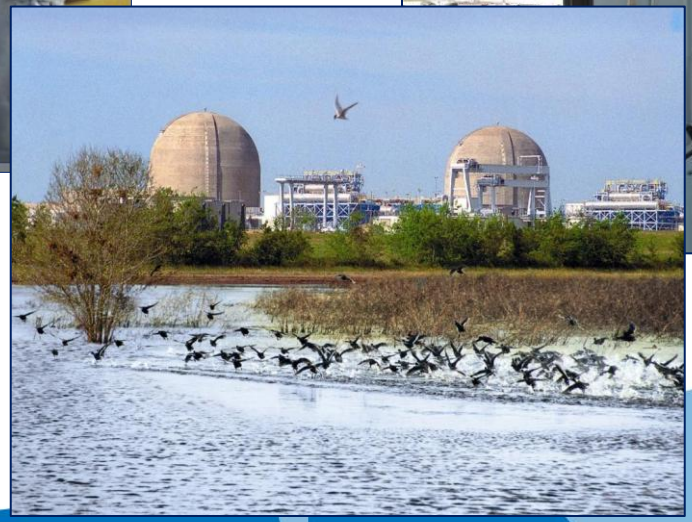
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Safety

Security



Environment

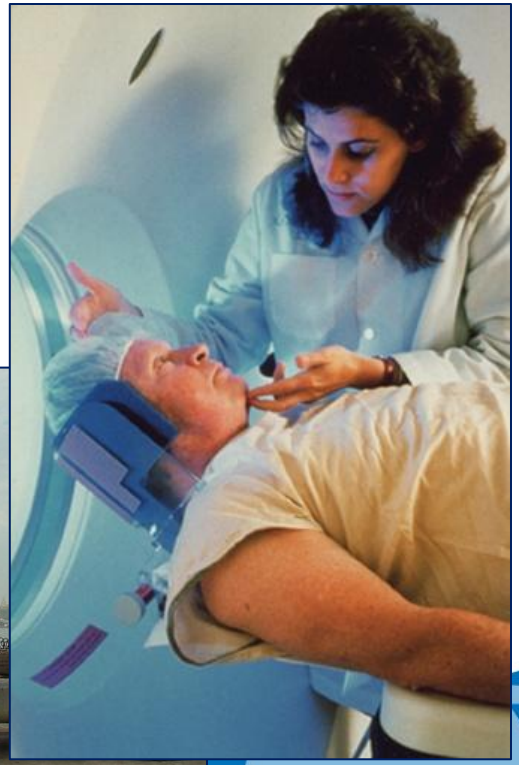


What we regulate

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Reactors

Materials



Waste

How we regulate

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Agencies operate only within the bounds of authority granted to them by Congress
- NRC → Atomic Energy Act
- Statutory hallmark
  - Reasonable assurance of adequate protection of public health and safety and common defense and security

How adequate protection is factored into decision-making

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Risk consideration
  - Assessment of probabilities and consequences
  - Concerns based on realistic assumptions; real world safety, security, or legal issues
  - Not looking for “zero risk”

6

Extreme External Events

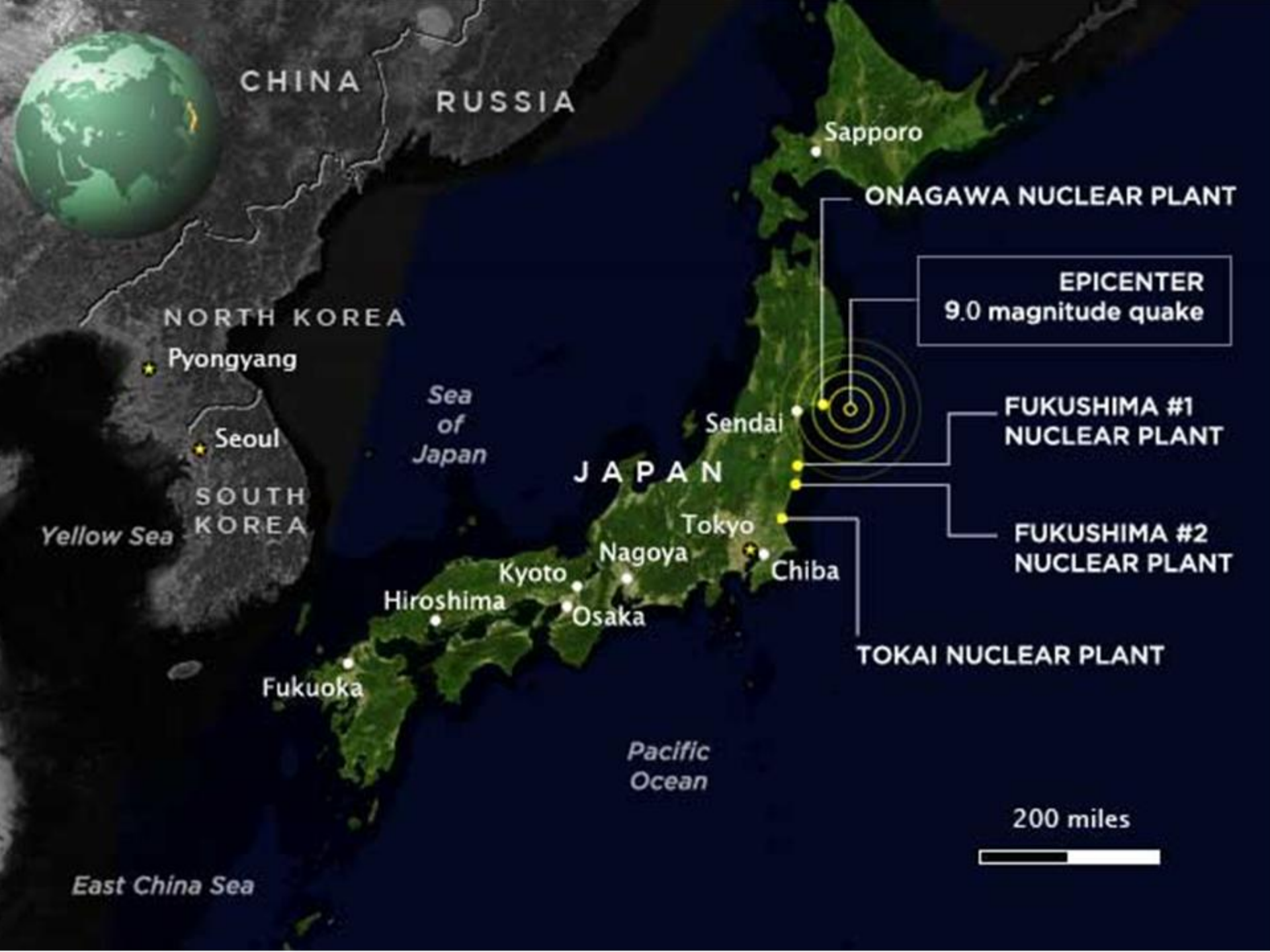
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Defense-in-depth philosophy
- Risk is not a static concept
  - Climate change (potential increase in magnitude of floods)
  - Improved state-of-knowledge of hazards (e.g., seismology, hydrology)
  - Aging infrastructure (e.g., nexus between flood control and nuclear sites)
- Maintain strong operating experience programs
- Vigilant periodic review of hazards and risks

Fukushima Daiichi

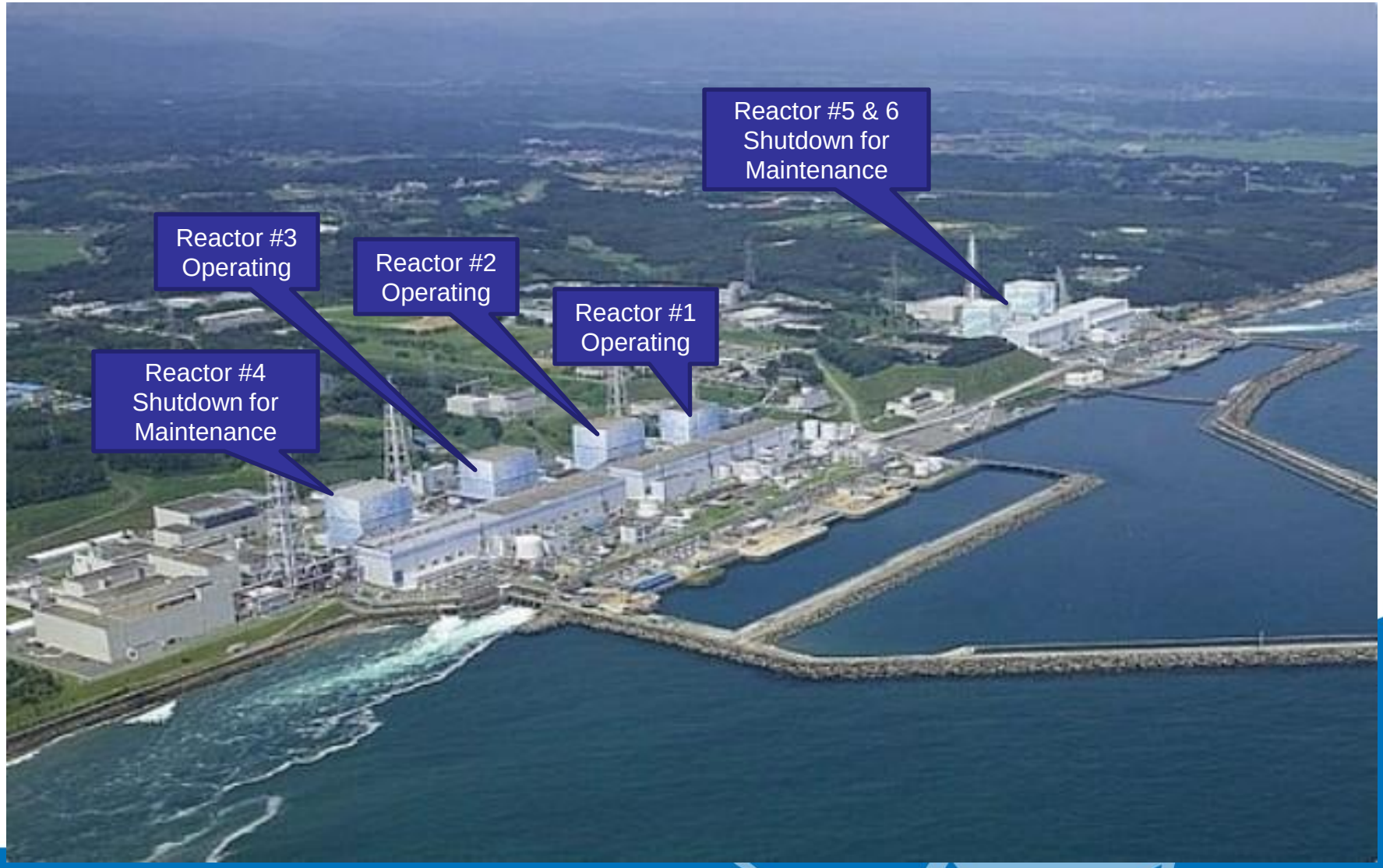
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Event background
- NRC actions
- Next steps


CHINA
RUSSIA
Sapporo
ONAGAWA NUCLEAR PLANT
EPICENTER
9.0 magnitude quake
NORTH KOREA
Pyongyang
Sea
of
Japan
Sendai
FUKUSHIMA #1
NUCLEAR PLANT
Seoul
JAPAN
SOUTH
KOREA
Yellow Sea
Tokyo
FUKUSHIMA #2
NUCLEAR PLANT
Nagoya
Chiba
Kyoto
Hiroshima
Osaka
TOKAI NUCLEAR PLANT
Fukuoka
Pacific
Ocean
200 miles
East China Sea

Fukushima Daiichi NPP

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment



Sequence of Events

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Friday, March 11, 2:36 pm local time:

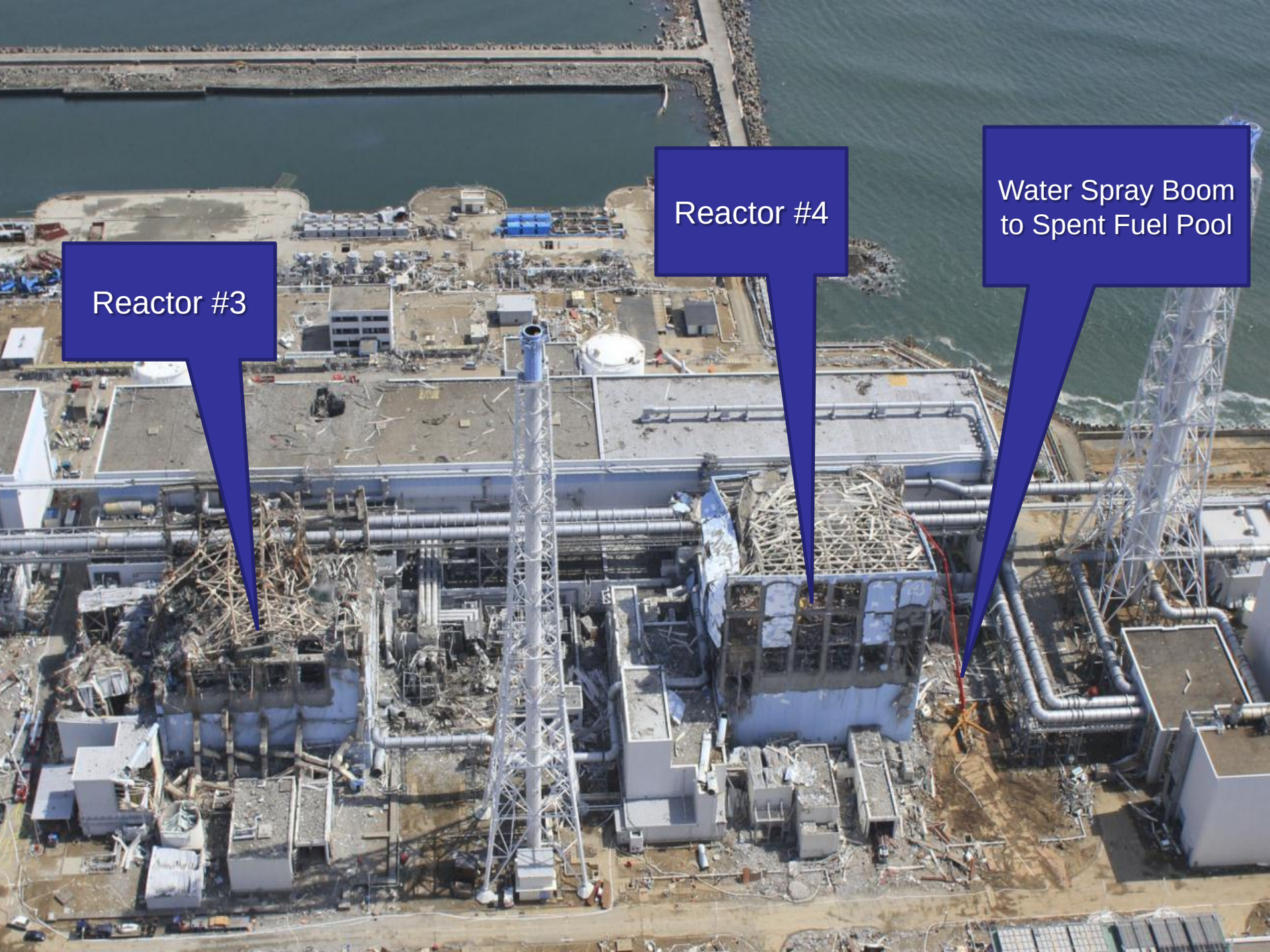
- Magnitude 9.0 earthquake 231 miles northeast of Tokyo
  - One of the five most powerful earthquakes since 1900
- 15-meter tsunami at plant
  - Much higher in other locations in northern Japan

Sequence – continued

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Three operating units shutdown at time of earthquake
- Offsite power lost; emergency diesels supply power
- Tsunami strikes site and wipes-out emergency power
- Extended station blackout – loss of all AC power
- DC batteries deplete and subsequent loss of reactor cooling
- Late injection of seawater using fire trucks
- Significant core damage at units 1, 2, and 3
- Hydrogen generated from metal water reaction in cores
- Hydrogen explosions in Units 1, 3, and 4 reactor buildings

Tsunami exceeded the design assumption that led to extensive plant damage and extended station blackout


Reactor #3
Reactor #4
Water Spray Boom
to Spent Fuel Pool

NRC Task Force

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Senior level agency task force
- Methodical and systematic review
- Near term and long term objectives
- Recommendations to be provided to Commission
- Publicly available report

Near Term Review

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Evaluate Fukushima Daiichi accident
- US operating reactors and spent fuel pools
  - External events
  - Station blackout
  - Severe accident mitigation
  - Combustible gas control
  - Emergency preparedness
- Near term review due in 90 days (mid July)

Longer Term Review

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Based on near term review and additional insights from Fukushima accident
- Identify potential technical and policy issues
  - Research activities
  - Generic issues
  - Reactor Oversight Process
  - Regulatory framework
  - Interagency emergency preparedness

Actions to Date

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Information notice to NRC licensees
- Temporary inspections
  - Extensive damage and severe accident mitigation guidelines
  - Station blackout
  - Seismic and flooding
- Bulletin on mitigating strategy information
  - Maintenance and testing of equipment
  - Strategy implementation

EP Rulemaking

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Rulemaking initiated pre-Fukushima
  - Revisions to existing regulations
- Lessons learned over the last 30 years
- Some key elements:
  - Evacuation Time Estimate updating
  - Emergency Action Levels for hostile actions
  - Emergency Response Organization augmentation at alternate facility
  - Challenging drills and exercises
- Final rule before Commission for approval
- NRC Task Force also looking at EP

Other Key Areas

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Emergency Command and Control
  - Executing emergency procedures and actions under challenging plant conditions
- External communication and outreach
  - Shared responsibility of regulator and industry
  - Promote understanding of risks and the bases for regulatory activities
  - Proactive engagement

Conclusion

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Maintaining a systematic and methodical review in response to Fukushima:

- Risk consideration
- Keeping concerns in context
- Follow regulatory processes for new requirements
- Supporting changes with solid analyses, and engagement with stakeholders
- Consideration of all regulatory tools

Thank You

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Questions

Comments

Discussion